ABSTRACT

An eye-safe atmospheric aerosol lidar featuring high transmit pulse energy to generate strong backscatter from long ranges in a single pulse together with an optically efficient receiver is disclosed. The transmitter employs a gas cell and non-focused laser beam geometry to convert short wavelength laser light to substantially safer and longer wavelength light by stimulated Raman scattering. The longer wavelength light is substantially safer than the shorter wavelength light thereby allowing the safe transmission of high energy pulses. The transmitter also features a diode injection seed and a beam expander which are effective to reduce the divergence of the long wavelength light below the field-of-view of the receiver. The receiver employs a telescope, collimating lens, interference filter, focusing lens, avalanche photodiode detector, amplifier and analog to digital converter. The transmit beam and receiver field of view are coaxial. Initial results demonstrate the ability of such technology to elucidate the structure of the atmosphere with high temporal and spatial resolution.